Key Bridge SAS + ESC

Introduction to our proposed
Spectrum Access System &
Environmental Sensing Capability

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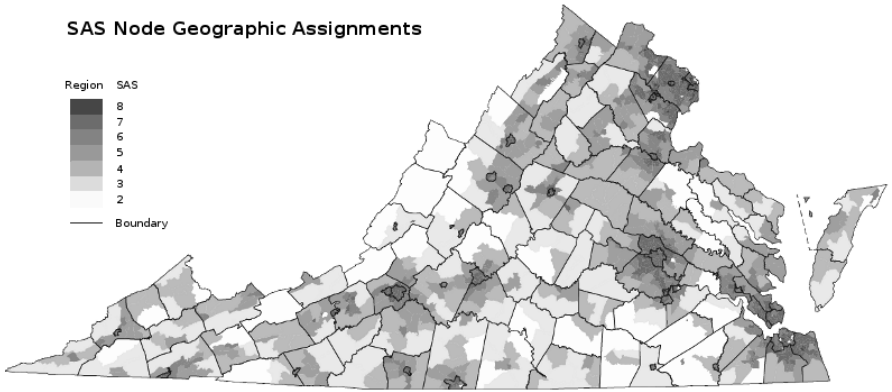
PARTITIONED SOLUTION IS FLEXIBLE, SECURE AND TRANSPARENT

SAS PROVIDES CBSD ENABLEMENT



ESC ESTABLISHES AUTHORIZATION

Principal Architecture Concepts:

- SAS has a service area
- ESC has a service area

Principal Operating Concepts:

- SAS registers with ESC
- ESC information is limited to the SAS registered service area

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ESC Service Area

ESC Service Cell

ESC Infrastructure

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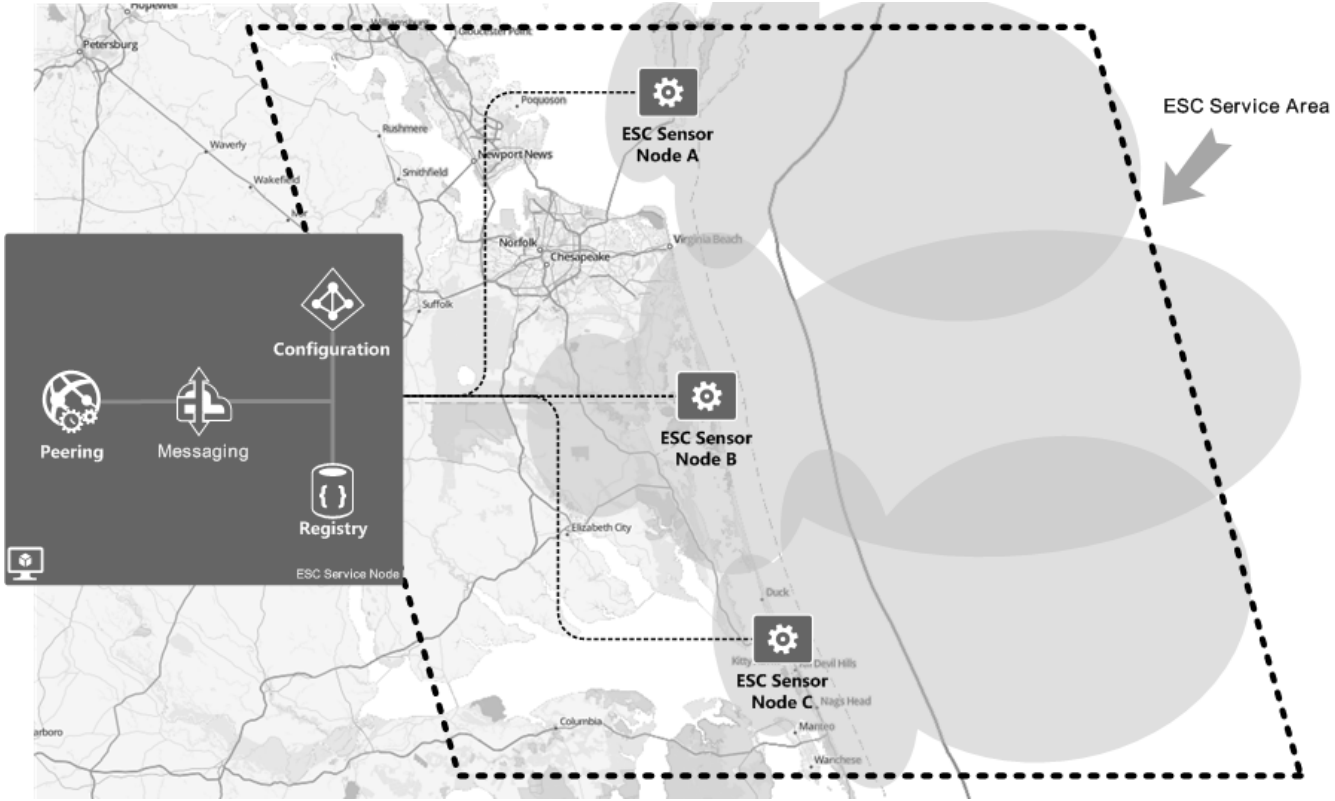
ESC COVERAGE REGIONS ORGANIZED INTO "**ESC SERVICE AREAS**"



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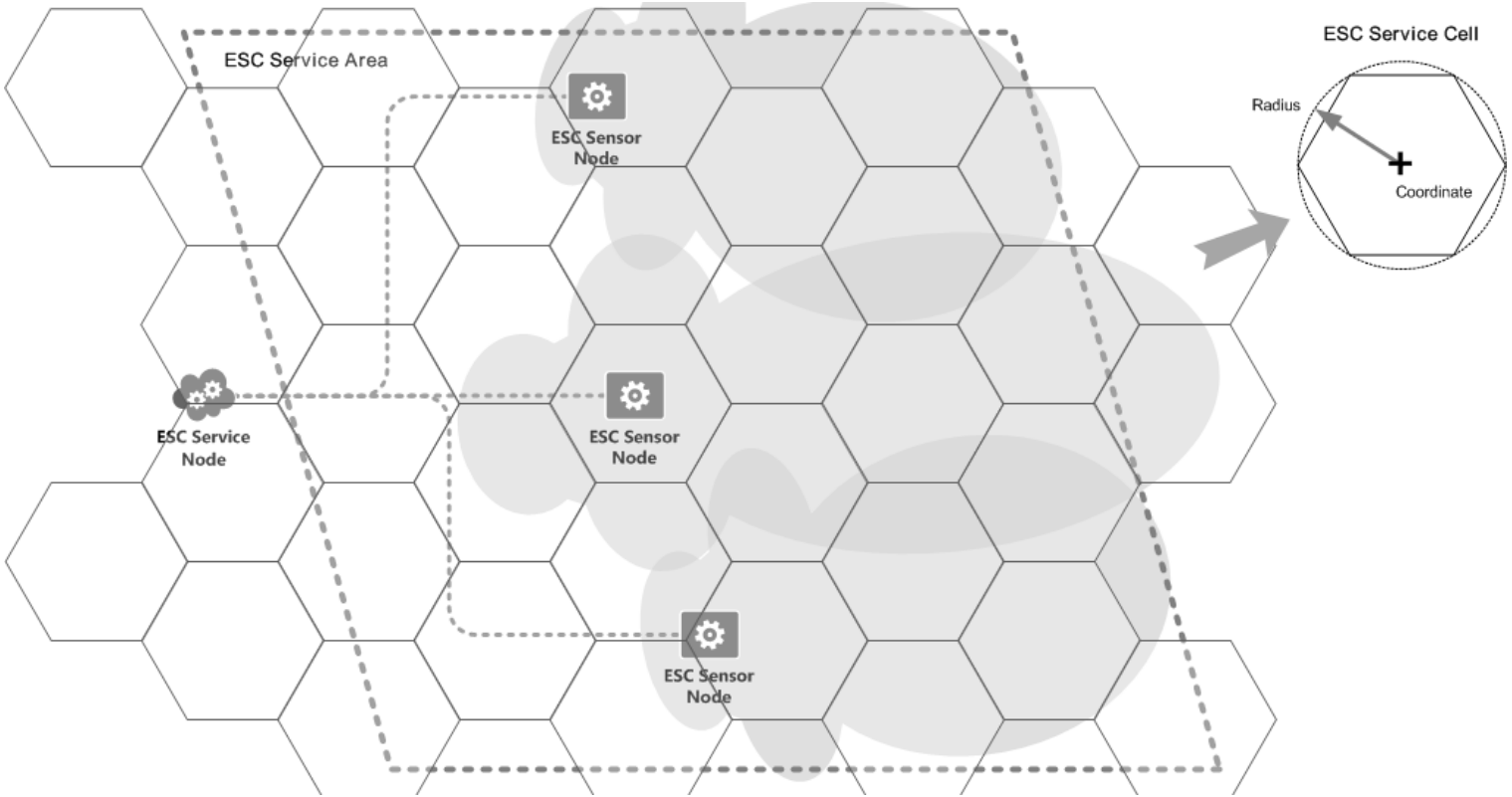
ESC SERVICE AREAS ORGANIZED INTO “**ESC SERVICE CELLS**”



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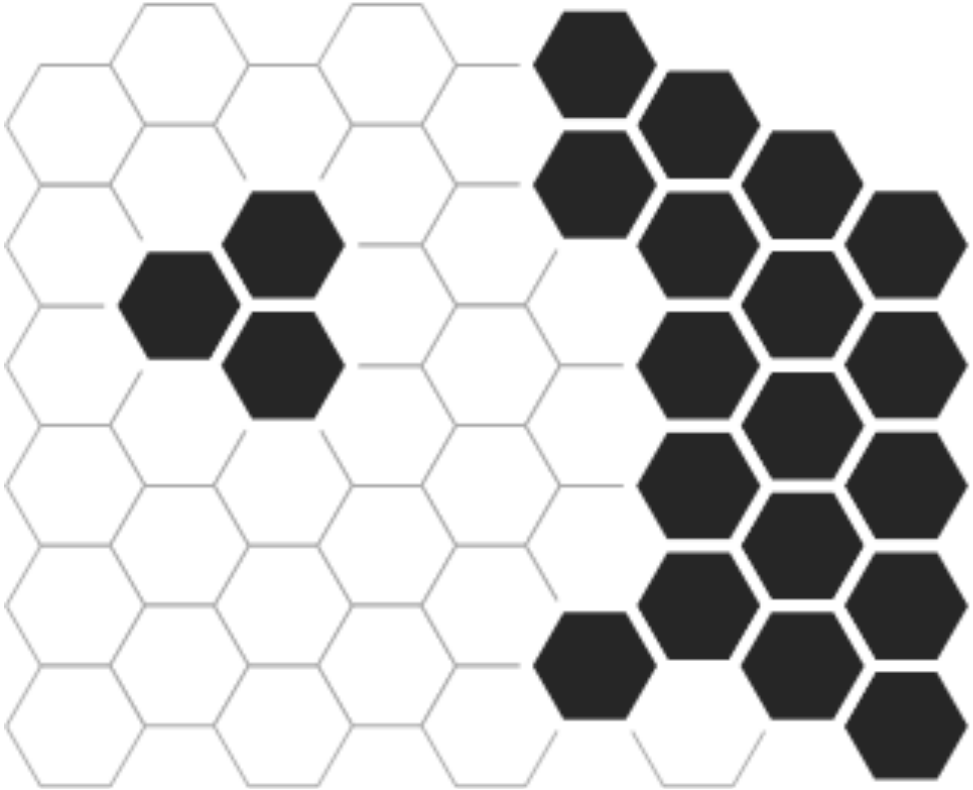
ESC SERVICE CELLS ARE DYNAMICALLY ENABLED OR DISABLED



SAS Node Updated

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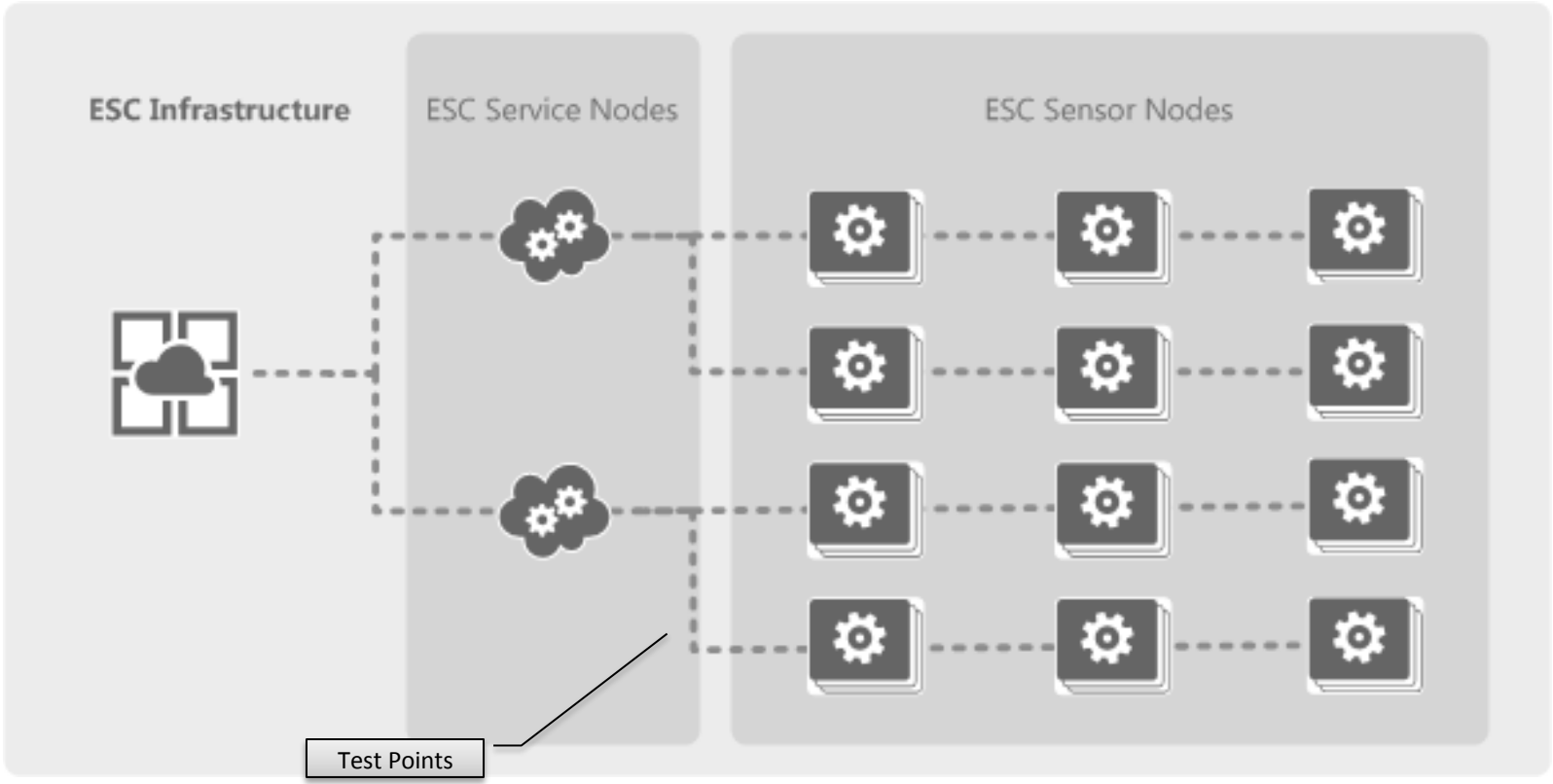
ESC INFRASTRUCTURE IS A DIRECTED ACYCLIC GRAPH SENSOR NETWORK

(i.e. No Routing Loops)



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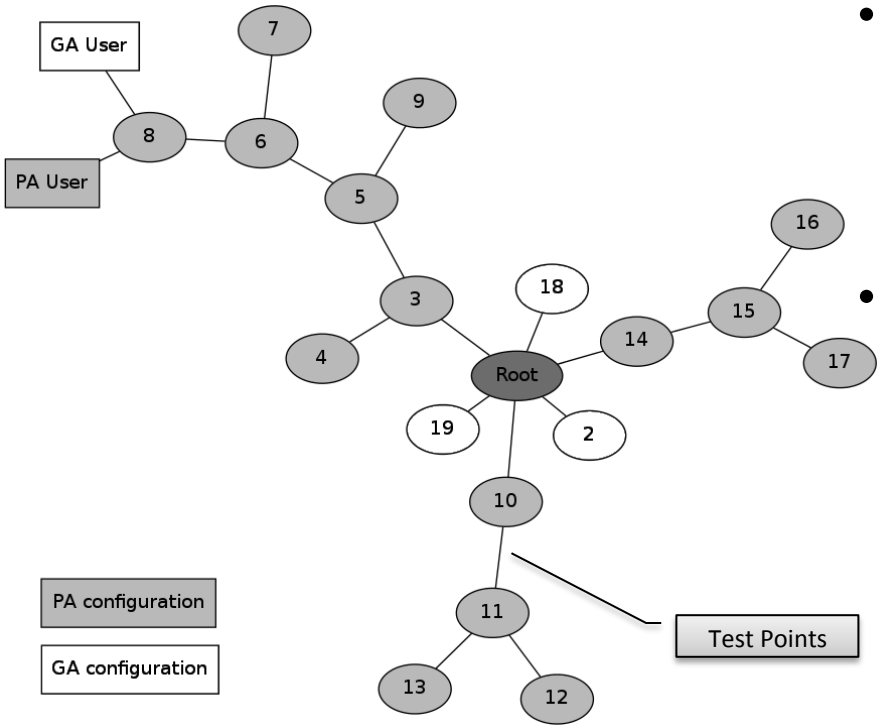
SAS Node

SAS Service Assignment

SAS Infrastructure

SAS INFRASTRUCTURE IS A ROUTED, DISTRIBUTED COMPUTING APPLICATION



- SAS Infrastructure Comprised of:
  - One or more *SAS Root Nodes*
  - A plurality of *SAS Nodes*
  - Administrative
- SAS Application is Functionally Partitioned
  - Typically by Geographic Region
  - AND/OR by Other Functions
    - Licensee
    - Channels (i.e. high vs. low bands)
    - Device Type, etc.

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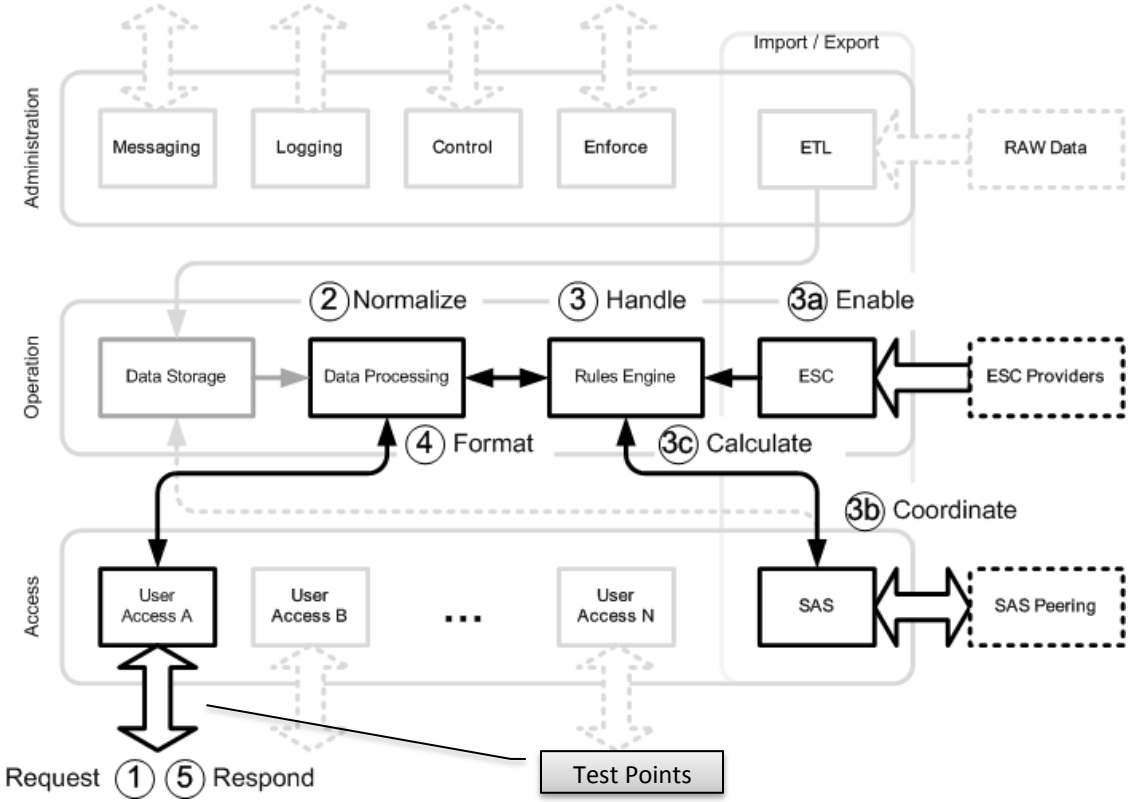
SAS NODE SERVICES PROVIDED THROUGH *USER ACCESS SERVICE* MODULE

UAS Module is Type Specific.

Matches existing OAM&P.

1. Request
2. Normalize
3. Handle
   a. Enable (via Peer)
   b. Coordinate (via Peer)
   c. Calculate
4. Format
5. Respond



OPM&P: Operations, Administration, Maintenance, and Provisioning

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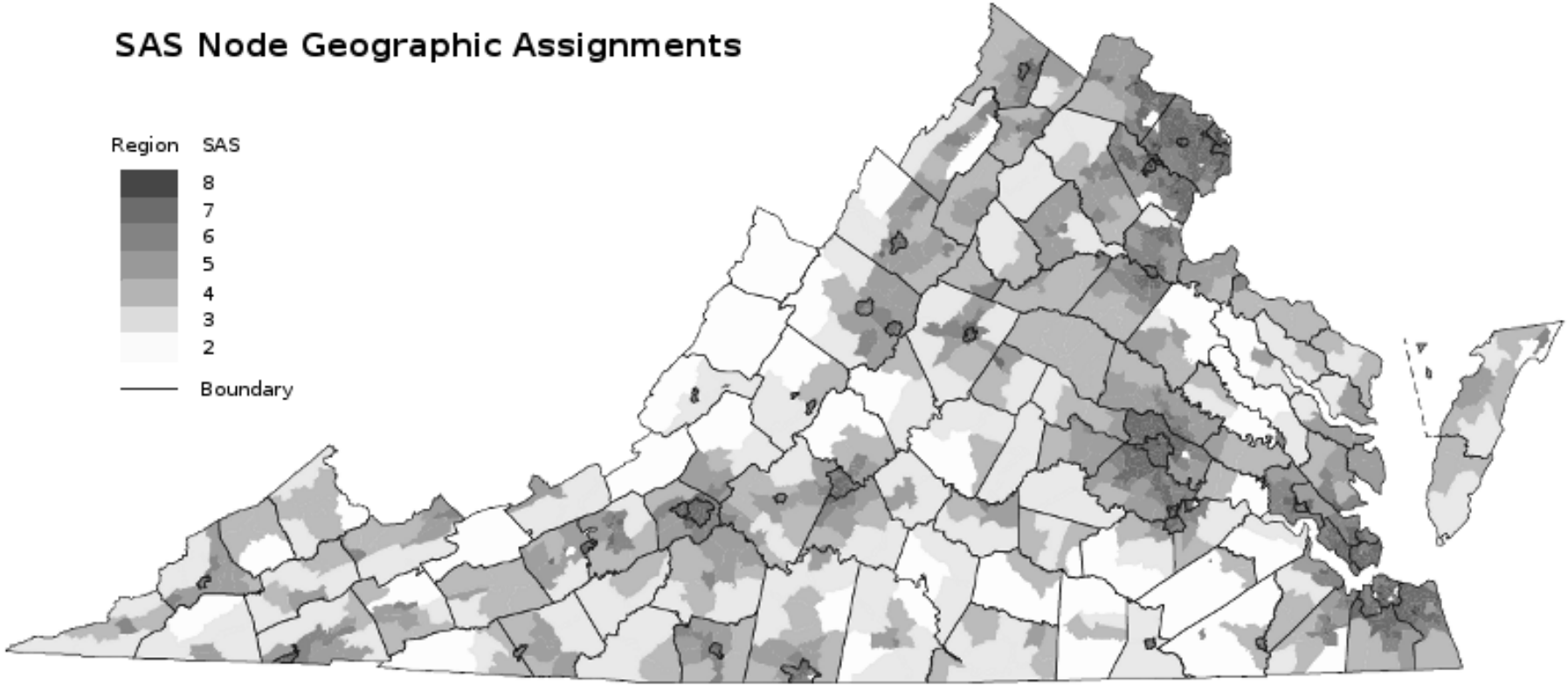
SAS NODES DYNAMICALLY PROVISIONED TO MATCH REAL-WORLD DEMAND



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SAS to SAS

SAS to ESC

Peering

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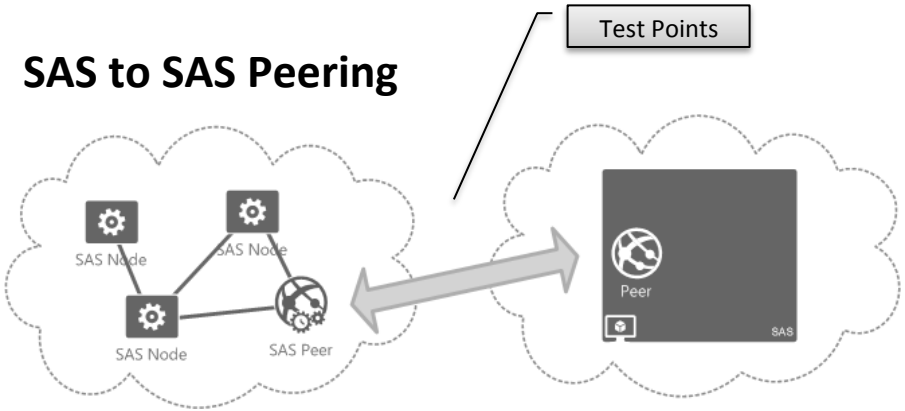
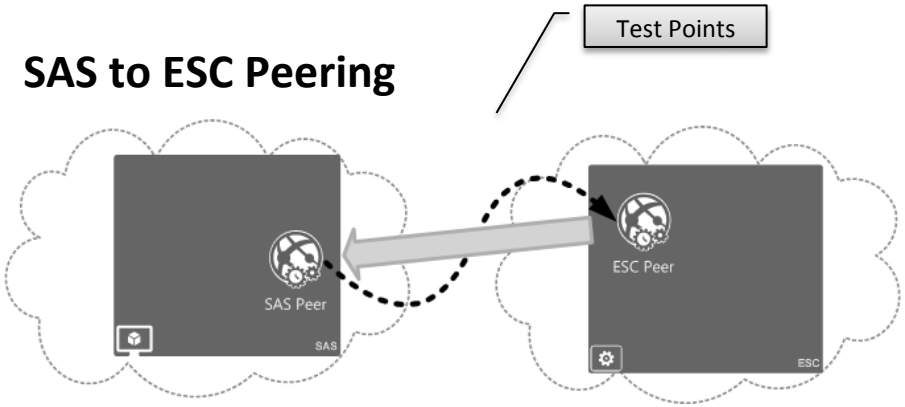
PEERING MASKS INTERNAL ARCHITECTURE; PROVIDES SECURITY, FLEXIBILITY

SAS to SAS Peering



- **SAS to SAS Peering**
  - Two-way information exchange
  - Sender initiated transactions

SAS to ESC Peering



- **SAS to ESC Peering**
  - Two-way information exchange
  - Client Registration transaction
  - Client Query transactions
  - Sender “PUSH” updates

Positive Correlation

Negative Correlation

ESC Infrastructure (Methods)

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POSITIVE CORRELATION (IDENTIFY AND PROTECT INCUMBENT)

ESC Sensor Nodes

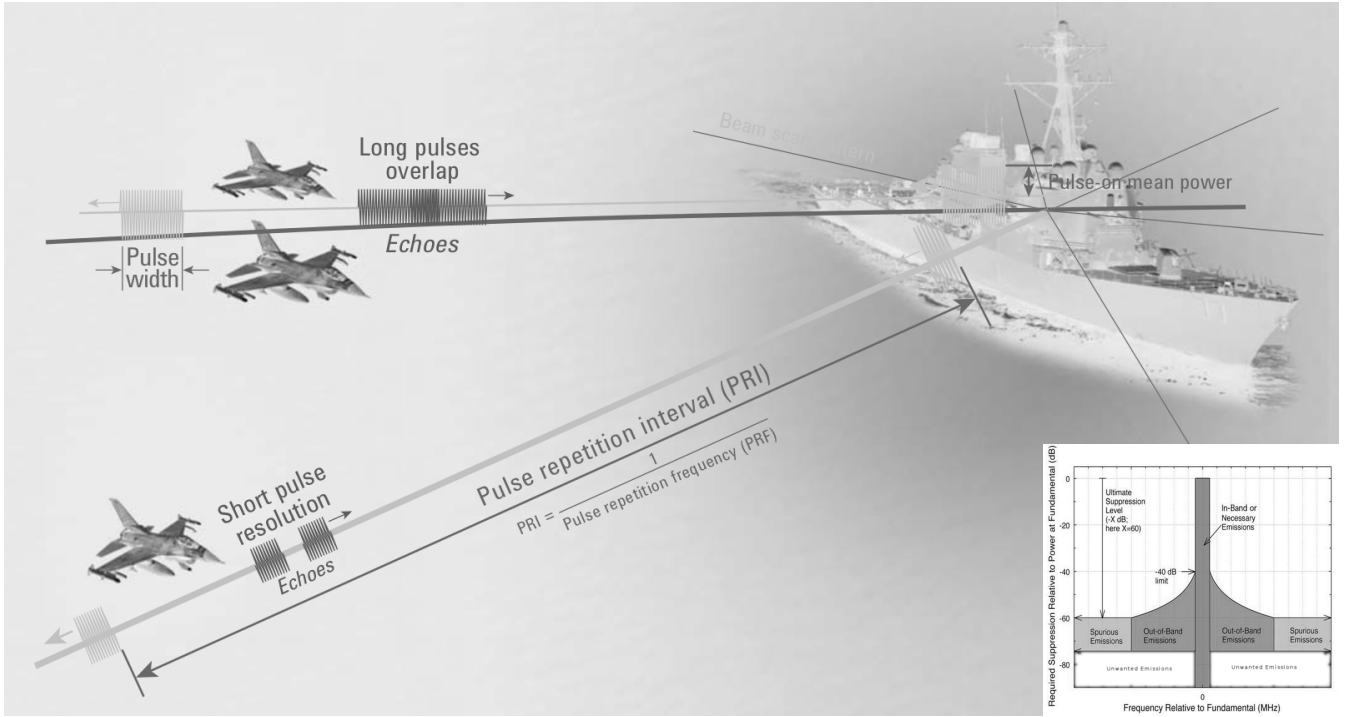
Capable to detect, classify and recognize in real time

- Pulsed, unmodulated transmissions

AN/SPN-43

Air Surveilance Radar

3.50 – 3.65 GHz	
850	kWatt
0.9	µs Pulse
0.001	Duty Cycle



ESC Sensor Nodes accept and match the RSEC Criteria C radar emission mask.

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NEGATIVE CORRELATION (PROTECT ALL STRANGERS)

ESC Sensor Nodes

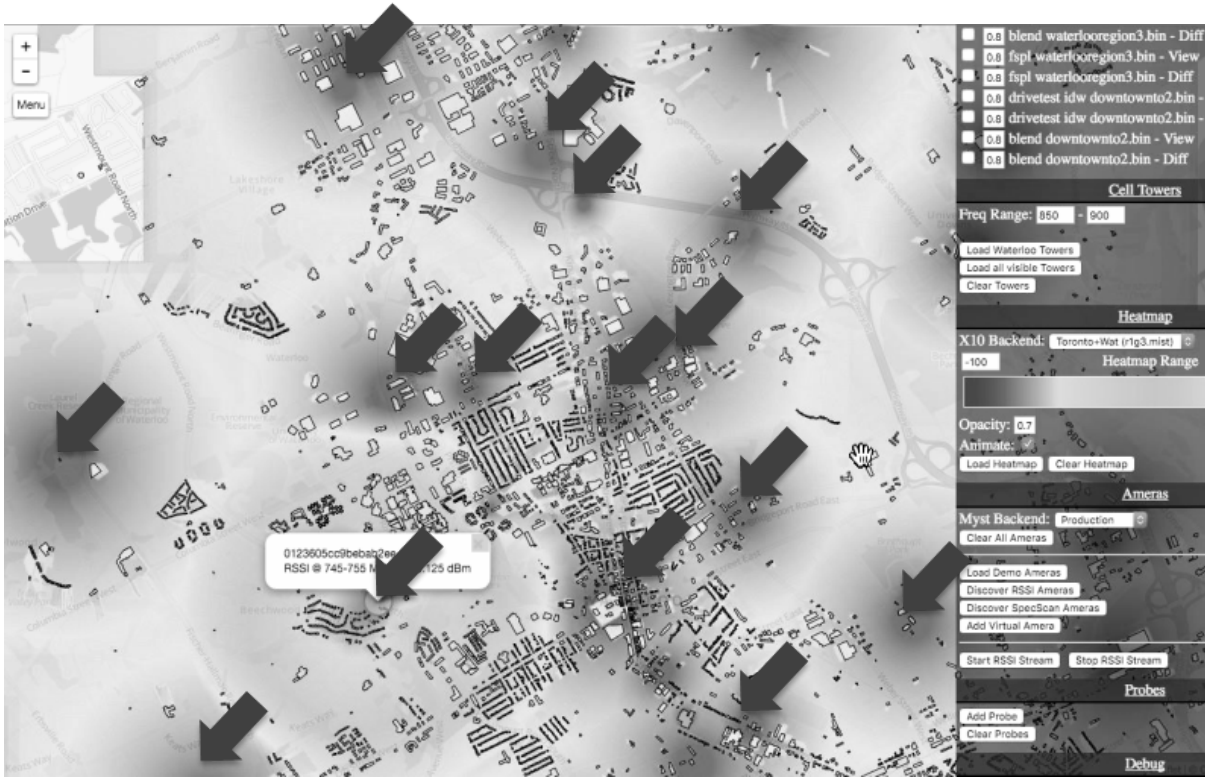
Capable to detect, classify and recognize, in real time:

- All authorized and expected transmitters; and
- Any unexpected transmitters

Positively identify any digitally modulated carrier. Specifically:

- LTE (OFDM)
- WiMAX (802.16)
- WiFi (802.11)
- Others e.g. 64QAM with RS encoding, etc.

Protect unknown transmitters, especially if they “look” like radar.



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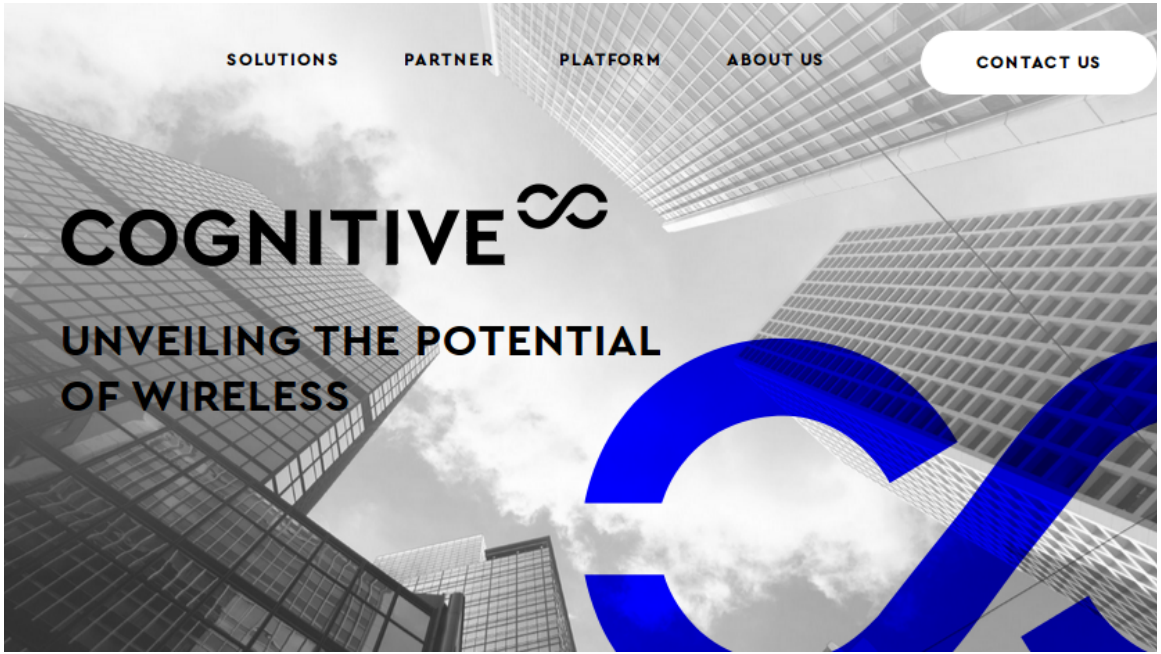
ESC Infrastructure (Apparatus)



Cognitive Systems Corp.

Sensor apparatus presentation.

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Spectrum Exchange

Spectrum Rights Flow and Clearing

Leasing

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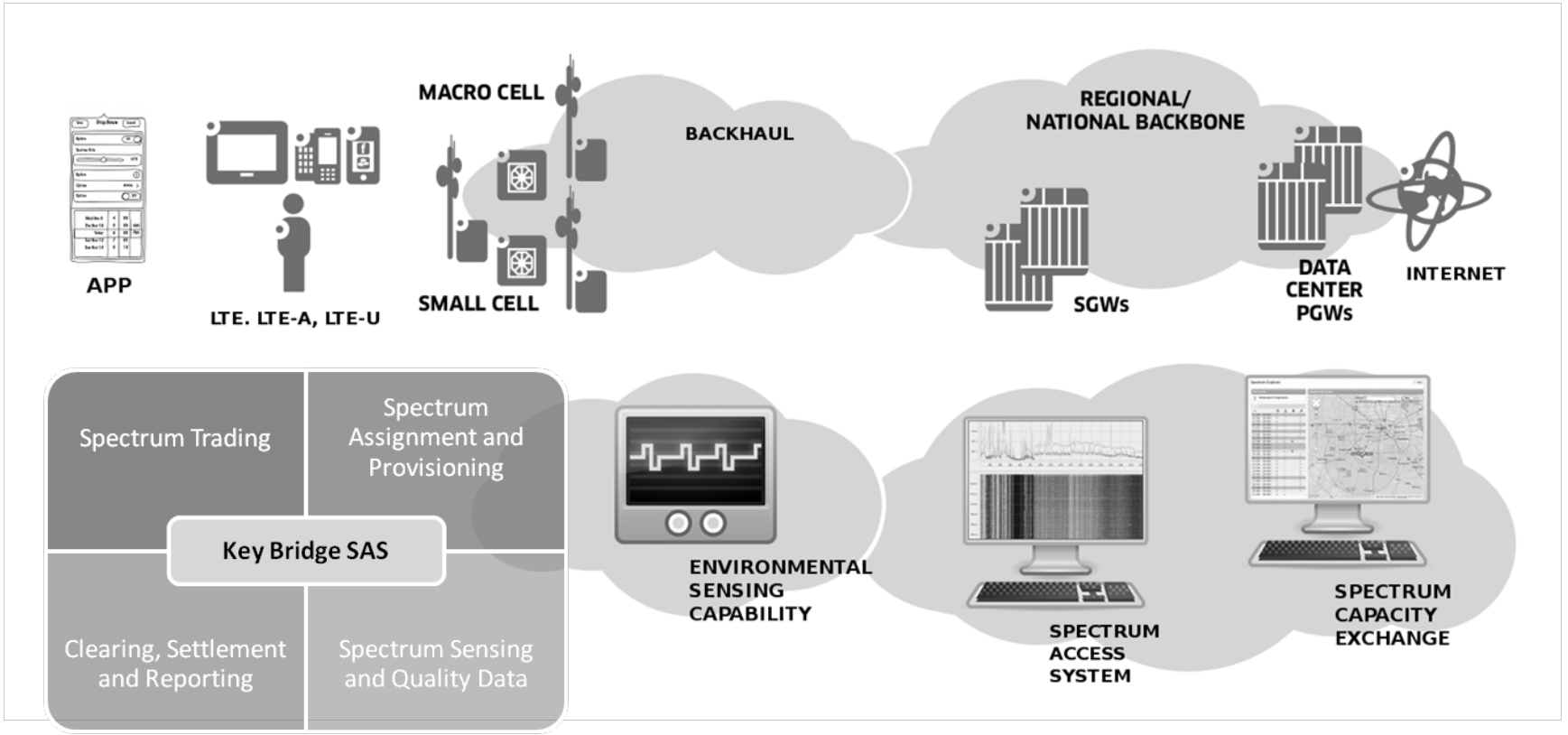
KEY BRIDGE LEASING ENABLES SPECTRUM CAPACITY EXCHANGE



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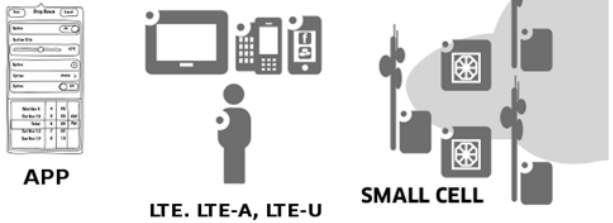
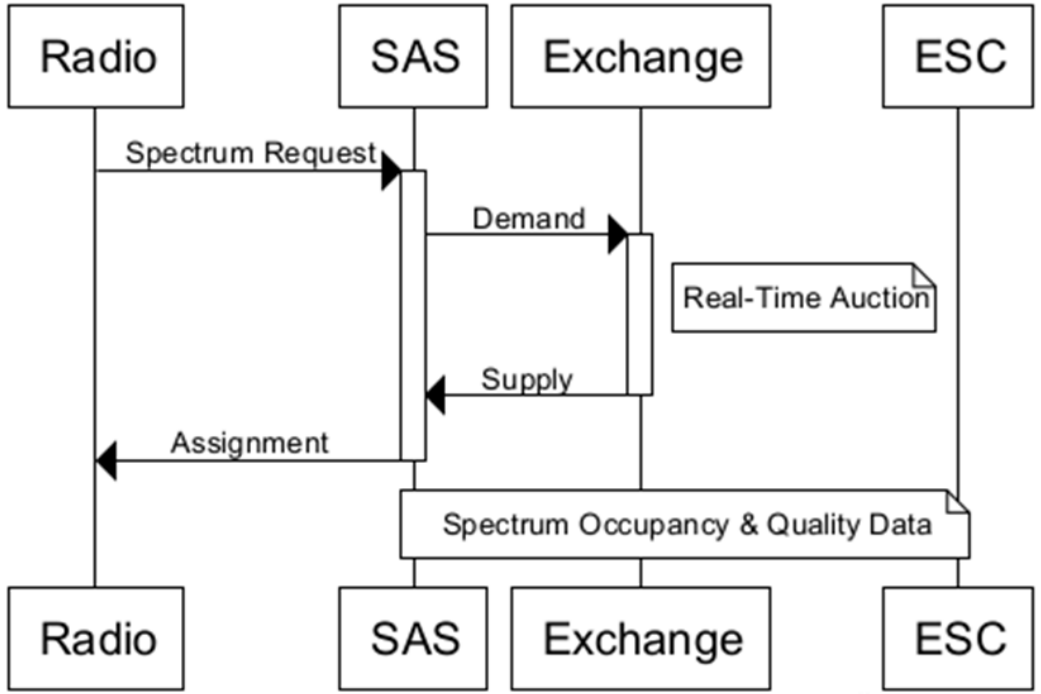
ON-DEMAND NETWORKING TRANSACTION





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QA + Next Steps

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